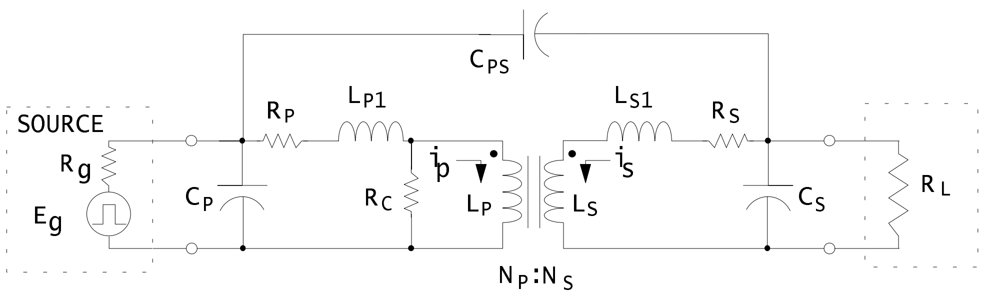
PULSE TRANSFORMERS

TRANSFORMER EQUIVALENT CIRCUIT:

The influences of a transformer's parameters can best be understood by considering the equivalent circuit in below.

This ciruit shows a typical output pulse waveform. Assuming that this output pulse is the result of injecting an ideal rectangular input pulse, one can see that a number of parameters are distorted. Overshoot, droop, back swing, rise time, etc. appear as unwanted signal distortion on the output pulse. Assuming the pulse transformer is properly matched and the source is delivering an ideal rectangular pulse, the transformer should have low values of leakage inductance and distributed capacitance while having a high open circuit inductance. This will limit the deterioration of the pulse shape. Also, the fact that the source will never produce an ideal rectangular pulse adds to the problems of distortion.



Transformer Equivalent Circuit.

Where:
R_g = Internal resistance of the driving source.
E_g = Open circuit source voltage.
R_P = DC Resistance of the primary winding.
R_S = DC Resistance of the secondary winding.
R_L = Load Resistance on the secondary winding.
R_C = Core losses expressed as a shunt resistance in parallel with the primary windings.
C_P = Primary shunt and distributed capacitance.
C_S = Secondary shunt and distributed capacitance.
C_{PS} = Primary-to-Secondary capacitance (inter-winding capacitance).
L_P = Primary inductance that is mutually coupled to the secondary.
L_S = Secondary inductance that is mutually coupled to the primary.
L_{P1} = Primary inductance that does not link the secondary (Primary leakage inductance).
L_{S1} = Secondary inductance that does not link the primary (Secondary leakage inductance).
i_P = Current in the primary turns.
i_S = Current in the secondary turns.
N_P = Number of turns on the primary.
N_S = Number of turns on the secondary.

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